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Research Paper

How do planners deal with barriers to climate change adaptation? A case study in Queensland, Australia

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ABSTRACT

Spatial planning at the local government level has a widely recognized role and responsibility to address the impacts of climate change. However, there are significant barriers to climate change adaptation and planning institutions and professionals are at the forefront of confronting these obstacles. This research documents how planners have responded to barriers to climate change adaptation at a professional level. The focus of this research is on the conditions of uncertainty and volatility of institutional policy frameworks for climate change adaptation; and the low prioritization of climate change adaptation among competing institutional objectives. The paper investigates how planners respond to these conditions and the resulting impact of their decisions on local level climate change adaptation. We report on a case study of the experiences and perspectives of local planners across Queensland, Australia. The contribution of this research is to document how planners respond to conflicts between institutional constraints and professional responsibilities for climate change adaptation. The case study identifies strategies that were employed by planning professionals to overcome common institutional barriers to climate change adaptation. Planners responded to problematic conditions by engaging alternative authorities, identifying substitute rationales, employing existing mechanisms, altering the framing of terminology and establishing regional coordination forums. These strategies provide options for professionals to overcome the barriers to climate change adaptation within their work and political environments.

1. Introduction: local level planning and climate change adaptation

Adapting to climate change is a critical and mounting challenge for contemporary spatial planning (Crane & Landis, 2010; Davoudi, Crawford, & Mehmood, 2009; Wilson & Piper, 2010). Climate change is now being realised and steps are being taken to adapt to changing conditions (Pielke, Prins, Rayner, & Sarewitz, 2007). This involves reducing the exposure and vulnerability of human settlements to climate change impacts (Schipper & Burton, 2009).

Planning is widely regarded by scientific and processional communities as having a critical role in facilitating climate change adaptation. For example, the Intergovernmental Panel on Climate Change (2007) calls for to a more effective consideration adaptation measures in land-use planning and infrastructure design. Similarly, the Stern Review (2007) identifies the planning system as the main means by which investments in public infrastructure and private property can be directed away from vulnerable localities. Responding to climate change has become a professional responsibility. The Planning Institute of Australia (2015, p1) advises that planners '*have a responsibility to integrate planning for climate change into their work and be proactive in the development of mitigation and adaptation strategies.*'

Local level municipal planning is often looked to as the instrumental framework and delivery mechanism for climate change adaptation (Measham et al., 2011; Mukheibir, Kuruppu, Gero, & Herriman, 2013). Planning has responded to climate change, local climate change adaptation plans have been implemented (Baker, Peterson, Brown, & McAlpine, 2012; Hurlimann & March, 2012), and regional planning has incorporated climate change concerns (Matthews, 2015). However, a number of barriers have also been identified (Bulkeley et al., 2011). Many of these barriers are more pronounced under the institutional contexts in which local planning takes place (Measham et al., 2011). The barriers to climate change adaptation identified in a review of the literature include the characteristics of established planning processes; the competition between planning objectives; the influence of economic development agendas; and the predominance of ill-suited institutional frameworks. Institutional dimensions are particularly significant factors when adjusting practices in adapting to climate change (Matthews, Lo,

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& Byrne, 2015). While the extant literature has studied these barriers (Moser & Ekstrom, 2010), research has only recently begun to explore possible solutions and offer guidance for planners experiencing these conditions.

In the face of climate change, how do planners deal with barriers that impede their efforts to facilitate adaptation? This research examines the operational level experiences and practices of local government planners in Queensland, Australia in response to strong political and institutional barriers to climate change adaptation. The context includes uncertainty and volatility within the institutional policy frameworks, and the low prioritisation among institutional responsibilities and objectives. The neoliberal political environment and the ensuing conditions are illustrative of commonly experienced obstacles to climate change adaptation. Our research draws on key informant interviews that focused on how planning institutions and professionals responded to the conditions that they identified as barriers. The contribution of this research is to establish an understanding of how planners respond to conflicts between institutional/political constraints and professional responsibilities in relation to climate change adaptation, and to identify a number of pragmatic strategies that have been, and can be used by planners to overcome barriers to climate change adaptation. The empirical findings from this study support the growing international literature on how local governments attempt to deal with climate change in the face of political denial at the state and federal levels.

2. Literature review: barriers to planning for climate change adaptation

The literature identifies a wide range of barriers to pursuing climate change adaptation through planning. While it is widely recognised that planning needs to respond to climate change, a number of factors are identified as continually constraining planners from achieving this objective. The following four themes characterise the literature on barriers to planning for climate change adaptation and summarise the obstacles that planners most commonly encounter.

2.1. Technical appropriateness of planning processes

Established planning processes may be technically unsuited to the challenge of climate change. One difficulty is the mismatch between planning horizons and climate change scenarios (Bedsworth & Hanak, 2010). Present political cycles, planning timeframes and social and economic objectives promote short to medium term planning horizons, but climate change requires that long-term conditions be considered (Wilson, 2006). As a result, more immediate objectives are prioritised over climate change adaptation that is limited to addressing current hazards (Wilson, 2006).

A second articulated challenge is the suitability of traditional predict and plan models of planning in the context of the uncertainty and complexity introduced by climate change. Standard planning approaches forecast future needs based on historical data and trend modelling, however, climate change introduces complex variables and multiple uncertainties that undermine our ability to forecast future conditions (Bedsworth & Hanak, 2010; Quay, 2010). The rate at which planning interventions can influence actual spatial patterns is another factor that potentially limits climate change adaptation. Planning generally produces incremental change to overall spatial patterns along current development trajectories. However, this may prove insufficient, as climate change will likely require more dramatic adjustments or transformations (Kates, Travis, & Wilbanks, 2012).

2.2. Competition between planning objectives

Planning may fail to deliver climate change measures because of the multiple complex objectives that need to be considered in an institutional environment. Bulkeley (2009) identifies the tensions between climate change adaptation and other legitimate dimensions of planning. He cites climate change adaptation objectives such as limiting development in floodplains, conflicting with other social objectives such as increasing housing supply (Bulkeley, 2009). Similarly, the scarcity of public resources can lead to conditions where planning objectives compete for limited resources, where conflict and competition between institutional objectives can constrain efforts to adapt to climate change (Measham et al., 2011). These situations are attributed to competing interpretations of sustainability and divergent conceptions of the public good (Owens & Cowell, 2010). Adaptation may be supported at the strategic level - but not implemented in any meaningful way. The balancing of various objectives is a legitimate function of planning and may reasonably qualify the achievement of some objectives. However, this process has historically resulted in the prioritisation of economic interests and the subordination of social and environmental objectives (Owens & Cowell, 2010).

2.3. Influence of economic development agendas

Economic development agendas may also undermine the potential for significant levels of climate change implementation. Climate change policy is subject to strong political influences (Giddens, 2009). Howard (2009, p. 30) argues that adaptation is *'not a task for which planning is constitutionally well equipped'* because of the persistent influence of political and economic forces. Economic interests drive the dominant development agenda and threaten to condition approaches to climate change adaptation (Grist, 2008). The rhetoric of climate change adaptation may fail to question the fundamental sustainability of economic objectives and development patterns (Brooks, Grist, & Brown, 2009). Efforts to operationalise concepts of sustainability have similarly fallen short. Unsustainable patterns of urban sprawl and automotive dependence contributed to climate change, planning failed to address and in some ways perpetuated these patterns (Brooks et al., 2009). Howard (2009, p. 30) terms these patterns as *'a century of disastrous planning'* for which planning is attributed *'historic culpability in the emergence of climate change'*. Concepts of sustainability have been appropriated and redeployed in support of existing development patterns (Davoudi, 2000; Gunder, 2006). Climate change adaptation risks similar problems because it is open to wide interpretation and difficult to translate into policy (Brown, 2011).

2.4. Institutional limitations and challenges

Local municipal planning is central to climate change action, and as a result, much research has focused on the institutional barriers at this level. A synthesised list of barriers to climate change adaptation put forward by Moser and Ekstrom (2010) based on a meta study includes: lack of information, lack of resources, institutional limitations, communication problems, and beliefs and values. Measham et al. (2011) identified a number of institutional impediments to climate change adaptation both internal to local government and from higher levels of government. First, the conceptualisation of climate change is often considered an environmental issue, and climate change adaptation is assigned to environmental rather than planning departments (Measham et al., 2011). Within this context, path dependency becomes a barrier in itself, as there is resistance to change within agencies and at the local level (Matthews, 2011). Second, the reliance of local planning practice on state policy to provide strategic direction, leads to a lack of motivation for climate change adaptation under existing policy frameworks that are silent on climate change (Measham et al., 2011). Third, the complicated place-based nature of local governance means that climate change adaptation objectives compete for resources against other local government responsibilities (Measham et al., 2011; Taylor, Harman, & Inman, 2013). These institutional barriers relate to the availability of information, the allocation of resources, and the setting of priorities.

Climate change adaptation pursued at the local level through existing land use planning frameworks is often constrained by a lack of high level policy to provide clarity about objectives, to promote strategic coordination and to resolve resource constraints (Macintosh, Foerster, & McDonald, 2015).

Combined, the barriers to climate change implementation at the municipal level are significant. Any attempt at implementing climate change measures at the local level becomes considerable when the agenda set by state and national governments denies climate change or deprioritises adaptation. The following case study research provides a context for this type of institutional challenge: where local governments were constrained by a clear state mandate that denied climate change.

3. Methods

3.1. Case study background and rationale

This research draws on a study of local planning practice in the state of Queensland to investigate responses to barriers to climate change adaptation in Australia. Queensland has a population of 4.7 million people, and has experienced sustained population growth over the past 10 years (QGT, 2015). Population and settlements in Queensland (see Fig. 1) are concentrated along the east coast and in the southeast corner of the state.

The State has experienced an increase in ambient air temperatures and increase in extreme weather events, a rise in sea levels and a change to rainfall patterns (Commonwealth Science & Industrial Research Organisation (CSIRO), 2014). These impacts are compounded by the location of major settlements and infrastructure in low-lying coastal areas (Low-Choy et al., 2010; Steffen, Huges, Sahajwalla, & Hueston, 2012). The Intergovernmental Panel on Climate Change regards Southeast Queensland as a *'hotspot of high climate change vulnerability'* (2014, p. 1377), while the Garnaut Review predicts climate change will have a *'moderate to extreme magnitude impact'* on coastal settlements in Queensland (Garnaut, 2008, p. 74). Governments throughout Queensland have begun to respond to climate change through regional planning (Matthews, 2015) and metropolitan planning (Zeppel, 2013). Despite the recognised impacts and the known economic costs and social consequences of climate change, efforts to pursue climate change adaptation throughout Queensland continue to face difficulties (Burton, 2014; Howes & Dedekorkut-Howes, 2014.).

3.2. Policy context and developments

This case was selected because it illustrates some of the institutional conditions commonly identified as barriers to climate change adaption. In particular, recent developments in state planning policy demonstrate the uncertain policy framework and institutional context under which local climate change adaptation planning occurs, and the subordination of climate change adaptation considerations by the institutional prioritisation of other objectives. These conditions further affected the availability of technical information, financial resources and political appetite for climate change adaptation. State planning policy over the research period was characterised by a strong neoliberal reform agenda.

Between 2007 and 2014 a number of state planning policies and instruments progressively introduced more detailed provisions related to climate change adaptation. This period was in general characterised by greater state government oversight of planning and a growing number of state planning interests (England, 2010). The State Planning Policy for Coastal Protection, adopted in 2012, in particular enacted provisions aimed at addressing the impacts of climate change. It set a state wide predicted sea level rise factor which local governments were required to adopt in their hazard models and planning schemes. It also directed local governments to prepare coastal hazard adaptation strategies. These provisions represented the most significant provisions of state planning policy aimed at addressing the predicated impacts of climate change and preventing development leading to further vulnerability.

In 2012, a new state government was elected on a platform of economic reform. The new government pursued a revised planning agenda which included reforms aimed to simplify planning regulations and streamline planning approvals. The focus of state planning turned to facilitating economic growth and the suite of previous state planning policies were repealed and consolidated (Steele & Dodson, 2014). The Coastal Protection State Planning Regulatory Provision, and then the Single State Planning Policy repealed the provisions of state planning policy related to climate change. These policies removed all reference to climate change along with any statutory directive or technical guidance on climate change adaptation. The new state planning policies replaced these provisions with the more general principle of considering and evaluating the impacts of natural hazards on development. The rational for this decision was that local governments were best placed to make decisions suited to local circumstances and local communities (Williams, 2013).

During this period, a number of local governments were in the process of preparing or revising their local land use planning scheme. Many of these planning schemes included provisions related to climate change adaptation. In some cases, the climate change adaptation provisions present in local planning schemes pre-dated the state policy, while in other cases the climate change factors were included in local planning schemes in response to the state planning policy. The climate change adaptation provisions of the Coastal Protection State Planning Policy were repealed and replaced by the Single State Planning Policy. A number of local governments had already developed, or were in the process of developing planning schemes which included climate change adaptation provisions that were consistent with the previous state planning policy but were omitted from the new state planning policy.

One local government, the Moreton Bay Regional Council, incorporated climate change factors in the Moreton Bay Region Planning Scheme, including a predicted sea level rise factor. This decision was based on current scientific and technical information, the weight of public concerns relating to flooding and coastal hazards, and to protect the council from legal liability (Solomons & Willacy, 2014). Subsequently, Moreton Bay Regional Council received a directive from the State Government to remove from the scheme any reference to *'a theoretical sea level rise due to climate change'* (Moreton Bay Regional Council (MBRC), 2014, p. 5). The reason stated was to ensure residents' rights to build and develop their property was not restricted (Solomons & Willacy, 2014). Other local councils were also instructed to remove reference to climate change from the planning schemes they were currently preparing. These events signalled to local governments that the state government did not support the incorporation of climate change factors in planning schemes.

Initially, climate change adaptation emerged as an increasingly important concern and central subject for state planning policy and local planning practice. However, later developments under a strong neoliberal reform agenda then removed all state planning policy giving guidance on climate change, repealed the statutory framework for climate change adaptation, and left the responsibility to make decisions about climate change to local governments. Subsequent directives specifically prohibited some local governments from including climate change provisions in their planning scheme while other local planning schemes maintained similar climate change provisions.

This volatile framework created uncertainty for planning institutions and professionals as they worked to address the impacts climate change on their communities. These conditions reflect the barriers to local level climate change adaptation anticipated in the literature. Burton (2014, p. 5) summarised the barriers to climate change in Queensland as follows: *'policy developed in response to climate change is being forged in one of the most volatile and contested political arenas in Australia… this presents particular problems for those trying to manage the relations between research and policy, between scientific evidence and*

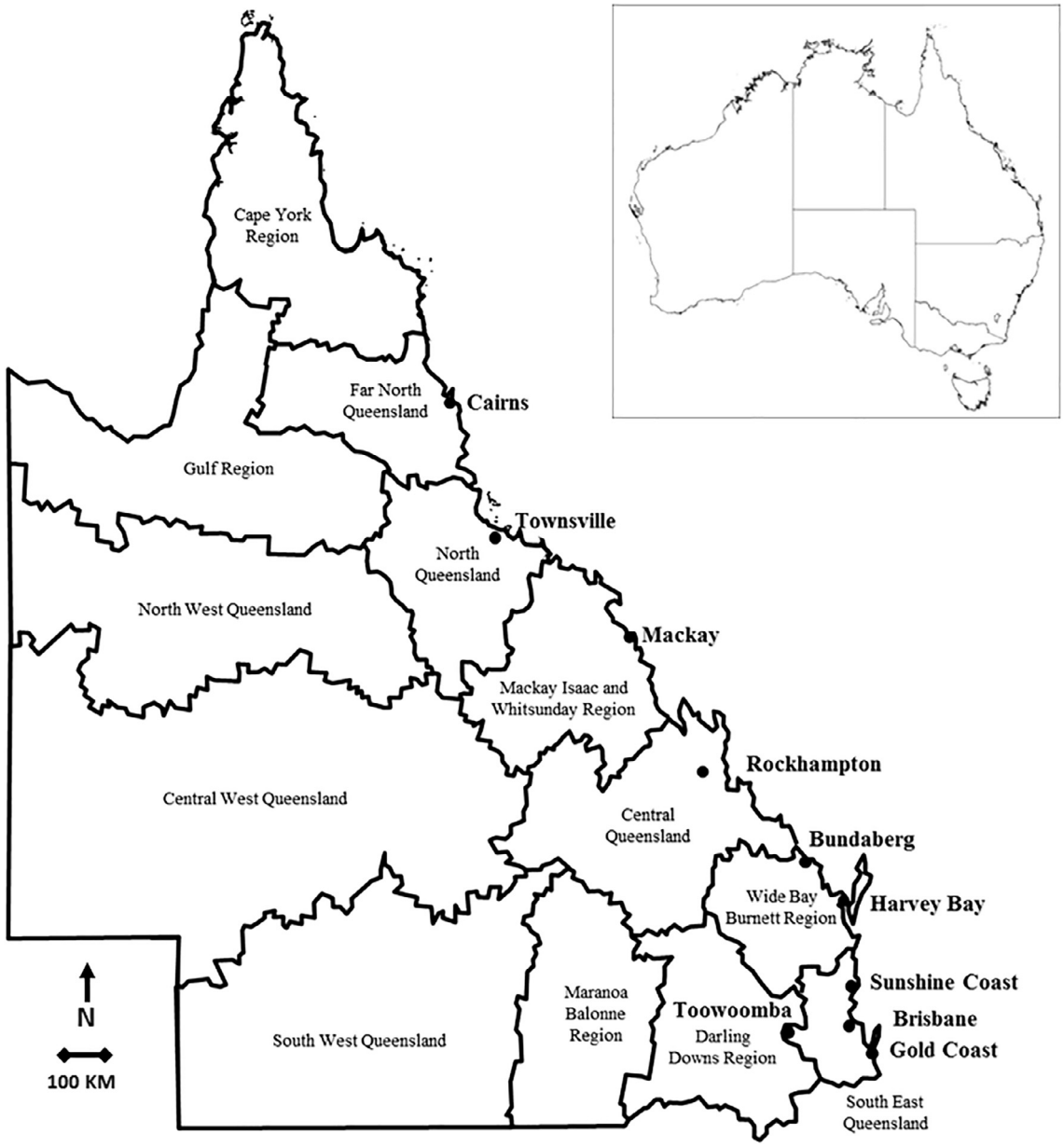

Fig. 1. Case study area and major metropolitan centres.

ideological faith and between facts and value'. It is within this institutional context our research was conducted.

3.3. Data collection and analysis

This research presents empirical data drawn from a qualitative case study of local climate change adaptation planning in Queensland. Interviews were conducted in the first half of 2014 and the interviewees reflected on policy changes between 2007 and 2014. This context draws on planners responding to climate change adaptation within a strongly neoliberal state agenda that did not view climate change as a significant policy priority and had repealed previous policy on climate change adaptation. Key informant interviews were conducted with 29 planners who had knowledge and experience of climate change adaptation planning in this context. Participants were drawn from the planning departments of local governments that were subject to coastal climate change impacts and that administered metropolitan areas with populations between 50,000 and 1,050,000. These criteria were established to target settings that involve both high climate change vulnerability from the advanced climate change impacts felt in coastal locations, and complex decision making situations where there were competing planning concerns and priorities. Participants were also selected from state government departments and professional organisations that had an interest in climate change adaptation, a bearing on local planning practice and a relevance to Queensland. Participants represented 15 local governments, 3 state government departments, and 5 professional planning organisations.

Semi-structured interview questions focused on barriers to climate change adaptation, how planners were overcoming these barriers, the effect of shifts in state planning policy on the ability to pursue climate change adaptation objectives, and the outlook for local government efforts to respond to climate change. The interviews were recorded and transcribed, and analysed following a deductive process of thematic content analysis to explore the experiences and perspectives of participants. Thematic summaries of the interview data was produced and supported by de-identified quotes from participants. The research process yielded 23 h of interview material.

4. Results: operational experiences and responses to barriers

4.1. Barriers to climate change adaptation

Planners were asked to identify the major barriers to climate change adaptation that they experience as a way establishing the conditions to which they were responding. They discussed three interconnected categories of barrier, and the barriers that emerged from the experiences of local planners reinforce some of the barrier identified in the literature. However, some differences were found in the relative emphasis and the interconnectedness of particular barriers in the context of this particular case.

4.2. Uncertainty of state planning policy

The most commonly identified barrier by all participants to local climate change adaptation was the volatility of state planning policy and the uncertainty it created. Participants described the condition of state planning policy in ways that emphasise uncertainty, for example: *'the shifting ground, particularly at the state level… the state has been quite all over the place' 'the chopping and changing of state policies'*; *'a bit of a moving beast'*; *'state level climate change policy is generally in a state of flux'*; and *'the last 18 months of uncertainty'*. These conditions left local governments unsure of how they should pursue climate change adaptation objectives. Furthermore, they made local governments hesitant to commit the necessary resources and pursue potentially unpopular policies. Participants articulated that: *'if you don't have backing from the state to make hard decisions that are not popular, it is very hard for a local government to swallow'*; *'some of these difficult to address policy areas will only be driven where there is an imperative from a higher level of government'*; *'until you get something coming from the state government, councils tend to tread softly on those sort of problems'*. Participants concluded that despite the technical knowledge of local governments and the capacity of the planning system, the uncertain policy framework under which local governments operate limits local level climate change adaptation.

4.3. Local government resources and priorities

A second barrier consisted of the resources necessary to model climate change scenarios, develop adaptation strategies, and undertake adaptation works. Participants commonly noted *'funding'*, *'resources'* and *'costs'* as a significant barrier to climate change adaptation: *'funding is an issue that everyone faces, because we have got a limited budget to undertake these studies and they can become quite costly'*; *'pursuing adaptation, for council there is obviously cost, horrendous cost'*; *'the money is just non-existent as far as that sort of stuff goes'*. The scarce resources of local governments and their competing responsibilities constrained climate change adaption. Participants observed that climate change adaptation was marginalised by the other priorities: *'funding at this point of time, this policy area is not really a key policy area for council'*; *'there would be some questioning whether it is the best way for us to be spending money relative to higher priorities'*. As a result, climate change adaptation projects are particularly susceptible to being abandoned in the context of economic concerns: *'adaptation is much easier when times are good, when budgets are good, when people are employed'*. Two further dimensions of this barrier were the difficulty in attributing clear costs and benefits to climate change adaptation, and the unequal financial and technical resources of local governments.

4.4. Potential for community opposition

The third obstacle consisted of community responses to climate change adaptation policies. Regulatory mechanisms such as the hazard overlays and code provisions of planning schemes are the principle way local governments can address climate change. However, decisions can impact private property and provoke community opposition. This opposition arises out of concern for how these provisions affect the value of property, increase insurance costs, or restrict development potential. These concerns can motivate public opposition to climate change adaptation policies. Participants recognised that local governments had *'concerns over the public reaction to the impact on property values and insurance costs'* and *'concern that when we have high minimum floor levels it imposes a higher cost for people'*. As a result, measures to address climate change are considered *'difficult'* or *'unpopular'* by local governments and by political representatives. Despite the responsibility of local governments to act in the best interests of the community, planners contended that climate change adaptation remains *'hard to sell'* and *'hard to swallow'*, for both the public and their representatives, and therefore becomes avoided or diluted. One participant explained that the major barrier to climate change adaptation is *'the will of local government to put measures in place in the planning scheme, there is not the will to use them to the full degree that they should be based on concerns about the community response'*.

Thus, the short term concerns of property owners on the impacts of climate change planning on property values and the costs to home owners makes it a topic that is best avoided. The strong property development lobby in Queensland and property ownership culture in Australia provide a considerable foundation for community opposition to climate change policy that "could" influence property values or development opportunities in the future.

4.5. Direct responses to barriers: reacting to institutional uncertainty

All local governments who took part in the research were impacted by these conditions and their implications to pursue climate change adaptation. A number of themes were evident in reports of how planning institutions and professionals responded to, and managed these barriers. Those who believed that climate change would have an impact engaged a number of strategies to keep it on the agenda, and deal with the lack of federal and state leadership.

4.6. Engaging alternative authorities

The initial response of local governments to changes to the policy framework for climate change adaptation was to investigate; planners reported that they were *'investigating what it means and what are the impacts'*; and *'trying to get our heads around the implications of the change'*. The changes created uncertainty, and the response sought to reduce this uncertainty. The effect was to delay action, as one participant reflected: *'we are investigating options, but we have not gone down the path of making an investment'*. Local governments turned to other authoritative sources of information to determine their course of action. They sought legal advice on their responsibilities and liabilities through the Local Government Association of Queensland. Participants commonly noted the *'legal advice from the Local Government Association of Queensland'*; and that *'the Local Government Association of Queensland has got some legal advice'*. This advice was that local governments have a responsibility to act in the best interest of their communities, and that there is a reasonable expectation that they will use the best available information. Local governments also engaged the technical guidance of scientific authorities to direct and justify their decisions. Planners reported *'deferring to information from the IPCC'* and basing decisions on *'advice from scientific bodies like CSIRO'*. In the absence of any guidance from the state government, local governments turned to legal and scientific authorities.

4.7. Identifying alternative rationales

The removal of the specific statutory framework for climate change adaptation brought into question the need of whether to consider climate change at all? However, planners from local governments emphasised the fundamental concerns and responsibilities of local

governments as a reason to address climate change. They noted that climate change adaptation was consistent with current scientific and technical advice and that *'those are decisions the councils have to make based on the best information at the time'*. They argued that responding to climate change is in the community's best interest and reinforced the commitment of local governments to *'look to the best interests of the community'*. They reasoned that climate change adaption was responsible governance *'because there is such a potential for impact on human life'*.

Local governments were also motivated by potential legal and financial liability. Planners reported that 'in terms of liability and risks, we probably do not have many other options' and that 'there is liability that council will be exposed to if we change our thinking in dealing with these hazards'; and reported that 'we have been limiting our potential liability and increasing community resilience'. A fundamental concern for the community, and a practical consideration of liability encouraged local governments to maintain climate change adaptation despite the lack of a statutory obligation.

4.8. Employing existing capacities

Planners expressed disappointment at the lack of state leadership, but confidence in the ability of local governments to develop and implement policy. They observed that local governments lead climate change adaptation, contending that *'we have had our head around this problem for quite some time'*; and that *'there are a lot of proactive local governments'*. Furthermore, they are accustomed to dealing with these conditions, one participant explained that *'the ironic outcome of devolution is that [local governments] pick it up and do something effective with it… you get really incredible leaps forward at that level'*. Although concerned by the lack of direction of state policy, most planners contended that local governments have both the knowledge and ability to address climate change. A range of studies detail the impacts of climate change, as participants identified: *'we have done the modelling'*; *'we have actually done quite a bit of local modelling'*; *'the climate hazard adaptation strategy study we have done'*. With this information, they could not therefore reasonably neglect climate change adaptation. Furthermore, local governments have the instrumental ability to respond to this information through the planning system. Planners suggested that *'the planning scheme is probably our best tool to deal with the changes … we have the tools in the planning scheme to be able respond*. While the climate change specific provisions were removed from state planning policy, participants argued that there remained adequate scope within the general provisions of hazard overlays and limited development zones for local planning to achieve some level of climate change adaptation.

4.9. Indirect approaches to barriers: recasting and reinforcing adaptation

Some planners proposed strategies to pursue climate change adaptation despite the present constraints imposed by federal and state governments. Their strategies were geared toward addressing and overcoming the barriers planners were experiencing through a variety of tactical manoeuvres and coping strategies.

4.10. Strategic shift in framing and language

One strategy used to overcome unsympathetic federal and state political priorities and uncertain policy frameworks was to change how climate change adaptation was "framed". Altering the way that climate change adaptation plans and strategies are described was a way of avoiding potential opposition. Planners reported that they were able to pursue climate change adaptation objectives as "hazard mitigation" or "flood resilience". This strategy allowed climate change adaptation to be pursued as a technical endeavour without stimulating political debate. As one participant said: *'messaging is critical… you learn pretty fast if you are paying attention that you change the words and get the same thing done… the bottom line is who cares what you call it if you are able to get the change that we need, trying to find words that everybody can agree with… messaging is absolutely important'*. In a similar way, participants also argued that the economic costs and benefits of climate change adaptation actions could be more effectively communicated. Articulating the economic rationale of climate change adaptation could appeal to the present economic priorities of governments and current community concerns about hazard vulnerability. This approach reinforced the technical and political expediency of climate change adaptation.

4.11. Engaging in voluntary regional coordination

One of the more problematic conditions caused by the uncertainty of state planning policy on climate change adaptation was the lack of cross-jurisdictional coordination and consistency. Compounding this was the unequal technical capacities and financial resources of individual local governments and the impact of this on their ability to develop and implement climate change adaptation strategies. While participants strongly advocated greater state leadership, they also reported that in its absence, a number of arrangements had emerged whereby local governments were coordinating and collaborating on a voluntarily level. One particular example was the Local Government Association of Queensland Coastal Council Adaptation Taskforce that provides a forum for councils to share knowledge and pool resources on climate change adaptation. These arrangements emerged in response to the deficiencies of state policy, as one participant described *'we now have a Coastal Council Adaptation Taskforce… there has been a big focus is on the impact the state's decision… they have come together to work collectively to increase capacity and ability to respond and adapt'*. While these arrangements were presented as having some scope to support local government climate change adaptation, they were not regarded as an ideal alternative to an overarching state planning policy.

4.12. Engendering community awareness and advocacy

Planners reported that the community was increasingly aware of, and concerned about climate change. They reasoned that experiences of climate change related hazards would promote adaptation: *'as effects become more evident… that is going to trigger change'*; *'as long we keep having incidents, we will have adaptation'*. Queensland had experienced a series of extreme weather events and the public was concerned with their impact. Because of these experiences, the community was more informed and sophisticated in their understanding of climate change. It was thought that this growing public awareness could lead to increasing efforts towards individual hazard resilience and growing support for government adaptation strategies: *'there is a growing awareness, so I would be suspicious if we do not have some degree of community support'*; *'people actually care and want to move forward with something, that means those representing the people need to move forward with it'*. Providing information on the risks and impacts of climate change was one way that planners could influence public opinion to create the conditions for a shift in priorities. It was suggested in almost half the interviews that planners '*build on community awareness so that on a political level resilience and adaptation measures will be accepted as a necessity rather than a burden*'. Overall, most planners interviewed were confident that public concern based on knowledge and experience would overtake present complacency.

5. Discussion: from common barriers to possible solutions

Various methods are used to identify and study barriers to climate change adaptation. These include conceptualising disconnects between current planning practices and the requirements of climate change adaptation, and adopting a critical perspective of the conflict between the objectives of climate change adaptation and economic development. Some barriers have also been identified by drawing on the

experiences of the professional community. This case illustrates a number of obstacles, particularly the uncertain and compromised institutional framework local planning often operates under, the difficulties in prioritising competing planning objectives, and the community dimension of local government decision making. These barriers are linked to the institutional conditions and political context of local government and are consistent with those identified in the existing literature (Bulkeley et al., 2011; Measham et al., 2011).

The literature on barriers to climate change adaptation describes a range of possible challenges planners may confront are they engage in climate change adaptation planning. The conditions described in the context of this case study provide insight into the relative significance and interconnectedness of some of these barriers. For example, planners did not highlight technical challenges associated with planning horizons and information deficiencies, but pointed to the volatile state policy position and competing local priorities as the main barriers. In this case, these institutional barriers were seen to give rise to further barriers by undermining the confidence of local governments to commit resources and make decisions in this policy area. Overall, the experiences of local planners in this case reinforce the barriers identified in the literature, but suggests that while some of the barriers can be addressed operationally, others are more fundamental. Within this context, the barriers that were experienced by planners were observed to have a synergistic impact – supporting each other - to impede any opportunity for change.

The Queensland case study offers an empirical insight into how professionals have responded to barriers to climate change adaptation. Planners worked to achieve about the best possible outcome despite constraining conditions from the state government. They sought to mitigate the effect of barriers by promoting alternative approaches and pursuing alternative arrangements. Where there was uncertainty about the obligation to consider climate change, planners emphasised the need to act in the public interest and make decisions based on the best available information. As there was limited guidance on appropriate responses to climate change, planners deferred to legal and scientific authorities for advice. Because there was no specific mechanism for climate change adaptation, planners employed more general planning mechanisms and provisions.

Institutional barriers existed, however planners were working to minimise the impact these conditions have on the ability to consider climate change in local government decision-making processes. Although municipal and state planners had little ability to modify the institutional/political conditions under which they operated, they were in most cases observed constantly responding to them and dealing with their consequences. The nature of this response is consistent with the literature on responses to neoliberal settings, which notes that planning is usually involved in tempering, rather than resisting non-ideal conditions (Campbell, Tait, & Watkins, 2014; Porter, 2013; Taşan-Kok & Baeten, 2012). We do not argue that all planners were attempting to address climate change under a restrictive regime, but rather individuals were able to integrate their professional beliefs in climate change and offer solutions to complex adaptation strategies within this context.

Some of the suggested strategies to address barriers to climate change adaptation have links to existing bodies of research. The importance of framing climate change adaptation in shaping decision-making processes by legitimising and privileging particular options has been established (Dewulf, 2013). In pursuing this strategy, planners can draw on two distinct bodies of literature. Research has been undertaken on the communication of climate science to non-technical audiences (Deser, Knutti, Solomon, & Phillips, 2012; Eliasson, 2000; Oke, 2006). Studies have also examined how best to frame and articulate planning objectives in contexts where traditional terminology carries negative associations (Bertolotti & Catellani, 2014; Gibson, Wieters, & Brody, 2015; Whittemore, 2013).

The voluntary regional collaborations that have emerged in the absence of high level coordination add to discussions of the mismatch between jurisdictional areas and problem boundaries (Bulkeley et al., 2011). Institutional structures and policy-making procedures will need to adjust to climate change (Burch, 2010). It is clear that from an operational perspective climate change is most appropriately managed, in part, at a regional level. While a statutory framework is favoured, in their absence voluntary arrangements presently serve this function. Such arrangements may offer a partial solution to the inconsistent governance structures, insufficient levels of coordination, and communication that regularly characterise efforts to address climate change impacts at the local level (Mukheibir et al., 2013).

6. Conclusion

The consequences of this research are threefold. First, the experiences of Queensland planners demonstrate that local level climate change adaptation will not proceed as straightforward and unhindered as may be hoped. Second, the Queensland case clearly demonstrates the destabilising influence of an uncertain political and policy framework, and the challenges that it creates for climate change adaptation. Third, climate change adaptation will likely be geographically uneven and non-linear because of the diverse and variable institutional resources and political priorities. A number of applied suggestions, grounded in the knowledge and experience from planners in this research, are identified for planners confronted by similar barriers. Planning professionals are able to respond to a lack of institutional interest in climate change adaptation by reinforcing the responsibility of local government to consider the best interest of their communities, and act on the best available information. They can refer to legal and scientific authorities for guidance on how to respond to the threat of climate change where high level policy is silent. Secondly, planners have the option of employing established planning mechanisms such as hazard overlays and limited development zones where specific measures are not provided. Thirdly, they can investigate arrangements for voluntary coordination and collaboration where high level institutional arrangements do not serve this purpose. Finally, planners may find it useful to change the framing and alter the language used to describe climate change adaptation to avoid inciting opposition, to appeal to current priorities, and influence public opinion. These strategies are derived from practical experiences of a unique case, but could be employed where similar conditions are experienced.

The Queensland case study provides an illustration of the types of situations in which planning professionals are confronted when trying to facilitate climate change adaptation. The barriers they experienced in this case, as in many other cases, are the uncertainty of institutional policy frameworks for climate change adaptation, and the low prioritisation of climate change adaptation objectives. Often these barriers “compounded” to make the challenges substantial for local decision making to make any changes for adaptation. Despite this, planners and the authorities for whom they worked were motivated by professional responsibilities, technical and scientific knowledge and concern for the community’s best interest.

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